

The opinion in support of the decision  
being entered today was not written for  
publication and is not binding precedent of  
the Board.

Paper No. 32

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

*Ex parte* SHOICHI KANDA, TAKESHI NARITA, MASAHIRO USHIGOME  
and MASAHARU NAGAHAMA

---

Appeal No. 96-2323  
Application 08/116,555

---

ON BRIEF

---

Before WINTERS, JOHN D. SMITH and OWENS, *Administrative Patent  
Judges.*

OWENS, *Administrative Patent Judge.*

*DECISION ON APPEAL*

This is an appeal from the examiner's final rejection of  
claims 1-5 and 7-18, which are all of the claims remaining in  
the application.

*THE INVENTION*

Appellants claim a process for making a water-in-oil

emulsion of a water-soluble polymer, and claim the emulsion made thereby. The process includes polymerizing at least one water-soluble vinyl monomer which is in a water-in-oil emulsion. The dissolved oxygen concentration of the emulsion before initiating the polymerization is about 100 ppb or less. Appellants state that due to the low oxygen concentration, the formation of agglomerates is inhibited (specification, page 2). Claim 1 is illustrative and reads as follows:

1. A process for preparing a water-in-oil emulsion of a water-soluble polymer comprising polymerizing at least one water-soluble vinyl monomer in a water-in-oil emulsion, wherein the dissolved oxygen concentration of the emulsion before initiating polymerization is about 100 ppb or less.

#### *THE REFERENCES*

##### *References relied upon by the examiner*

Fan et al. (Fan)	4,485,209	Nov. 27, 1984
Cadel et al. (Cadel)	4,783,513	Nov. 8, 1988

13 *Encyclopedia of Polymer Science and Engineering* 776-83 (John Wiley & Sons, 1988).

##### *Reference relied upon by appellants*

3 *Encyclopedia of Polymer Science and Engineering* 279-81 (John Wiley & Sons, undated).

#### *THE REJECTIONS*

Appeal No. 96-2323  
Application 08/116,555

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 1-3, 5, 7-15, 17 and 18 over Fan; claim 16 over Fan in view of 13 *Encyclopedia of Polymer Science and Engineering*; and claims 4 and 16 over Fan in view of Cadel.

#### OPINION

We have carefully considered all of the arguments advanced by appellants and the examiner and agree with appellants that the aforementioned rejections are not well founded. Accordingly, we reverse these rejections.

We first address the rejection of appellants' broadest process claim, which is claim 1, and then address the rejection of product-by-process claim 18.

#### *Rejection of claim 1*

Fan discloses a process for making a water-in-oil emulsion of a water-soluble polymer by polymerizing at least one water-soluble vinyl monomer which is in a water-in-oil emulsion (col. 2, lines 3-20). Before the polymerization is initiated, the water-in-oil emulsion is deoxygenated by a method such as subjecting it to a vacuum of from about 50 to about 500 mm of mercury under an inert gas atmosphere at a

temperature of from about 10° to about 40°C (col. 3, lines 59-67).<sup>1</sup> During the polymerization, the reaction rate may be controlled by introducing a small amount of air or oxygen into the reaction such that the oxygen concentration of the emulsion is desirably about 0.01 to about 1 parts per million (col. 4, lines 42-59), which is about 10 to about 1000 parts per billion (ppb). The teaching that the oxygen concentration can be raised to a level of 10 ppb during polymerization would have fairly suggested, to one of ordinary skill in the art, carrying out the deoxygenation of the emulsion prior to the polymerization such that the oxygen concentration is less than 10 ppb. Such an oxygen concentration is within the range recited in appellants' claim 1.

In view of the above disclosures, we are not persuaded by appellants' arguments that Fan does not suggest appellants' oxygen concentration before polymerization and that Fan's disclosure of introducing oxygen teaches away from appellants' claimed invention (brief, pages 10-11).

---

<sup>1</sup>Appellants disclose reducing the dissolved oxygen concentration of their water-in-oil emulsion by blowing nitrogen or argon through the emulsion (specification, page 5).

For the above reasons, we hold that the process recited in appellants' claim 1 would have been *prima facie* obvious to one of ordinary skill in the art over Fan.

When a *prima facie* case of obviousness has been established, appellants have the burden of rebutting it by presenting objective evidence of non-obviousness. See *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 882 (CCPA 1981). A final determination regarding obviousness is then reached by starting anew and evaluating the rebuttal evidence along with the evidence upon which the conclusion of *prima facie* obviousness was based. See *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Appellants have submitted a declaration by Kanda (filed July 7, 1994, paper no. 16) which shows the effect of the dissolved oxygen concentration of the water-in-oil emulsion before polymerization on the formation of agglomerates during polymerization. The declaration indicates (figure 1) that the amount of agglomerates rises sharply as the dissolved oxygen concentration is increased above 100 ppb, and Kanda states

(page 2) that the results show that a maximum dissolved oxygen concentration of 100 ppb is critical.

Appellants point out that the only example in Fan in which a dissolved oxygen concentration is disclosed is example 26 wherein the dissolved oxygen concentration is below 3000 ppb, preferably below 1000 ppb, and argue that in the comparative experiments in the declaration, the dissolved oxygen concentrations of 200 and 300 ppb are near the low end of Fan's range of about 10 to about 1000 ppb (brief, page 13).

The examiner argues that appellants have not shown that the process of Fan's example 1 produces a dissolved oxygen concentration of above 100 ppb (answer, page 12). In Fan's example 1 the emulsion is thoroughly deoxygenated by stirring it under vacuum for 10 minutes and subsequently breaking the vacuum with nitrogen, and repeating this procedure two more times (col. 8, lines 27-30). In Fan's example 26 a thin-film devolatilizer operating under a vacuum of 200 mm of mercury and a nitrogen atmosphere is used to deoxygenate the emulsion

(col. 13, line 65 - col. 14, line 4). The examiner argues that although the level of vacuum is not specified in Fan's example 1, and the reference does not disclose what is meant by "thoroughly deoxygenated", appellants also do not define what is meant by this term and, therefore, have failed to show that Fan's example 1 is not the closest prior art (supplemental answer, pages 3-4). This argument is deficient in that the examiner has provided no technical reasoning as to why the dissolved oxygen concentration is reduced to a lower level in Fan's example 1 than in Fan's example 26.

The examiner argues that there are differences between Fan's compositions and the composition used in the Kanda declaration, and that the initiator concentration, monomer concentration and emulsion stability affect reaction exotherm which, Fan teaches, affects agglomeration (supplemental answer, pages 4-5). Even if the examiner's assertion that initiator concentration, monomer concentration and emulsion stability affect reaction exotherm is correct, the argument is not persuasive because what Fan teaches is that the inability to control reaction exotherm can result in agglomeration (col.

1, lines 44-47). In appellants' example 1 used in the Kanda declaration, the emulsion was kept at 50°C (specification, page 8). There is no indication of an inability to control the reaction exotherm.

For the above reasons, we are not convinced that appellants did not compare their claimed invention to the closest prior art.

The examiner argues that because Fan teaches (col. 1, lines 44-47) that the reaction exotherm, which is dependent upon the reaction rate, and the extent of the agglomeration are related, the Kanda declaration does not show unexpected results (answer, page 12). The examiner argues that Fan teaches that the reaction rate and exotherm are affected by the dissolved oxygen concentration and that, consequently, it would have been obvious to one of ordinary skill in the art to reduce the dissolved oxygen concentration to the low level recited in appellants' claim 1 to avoid forming agglomerates (answer, pages 11-12).

The examiner's argument is not consistent with the evidence before us. Indeed, Fan teaches that an inability to



control the reaction exotherm may result in the formation of agglomerates (col. 1, lines 44-47). However, at 3 *Encyclopedia of Polymer Science and Engineering* 280, it is taught that oxygen is a polymerization inhibitor. This teaching indicates that reducing the dissolved oxygen concentration would increase the reaction rate, which would increase the reaction exotherm and, therefore, would tend to increase the formation of agglomerates. The Kanda declaration (figure 1), in contrast, shows that reducing the dissolved oxygen concentration reduces the agglomerate formation.

The examiner argues, regarding the Kanda declaration, that the dissolved oxygen concentration is only one of a number of parameters which affect agglomeration (answer, pages 12-13). This argument is not convincing because it is not apparent why, even if agglomeration is affected by factors other than the dissolved oxygen content, one of ordinary skill in the art would have been led by Fan to use a dissolved oxygen concentration of about 100 ppb or less in Fan's emulsion.

For the above reasons, we conclude that the rejection

Appeal No. 96-2323  
Application 08/116,555

over Fan of appellants' independent process claims 1 and 7, and dependent claims 2, 3, 5, 7-15 and 17, as stated and argued by the examiner, is not well founded. Because 13 *Encyclopedia of Polymer Science and Engineering*, which is applied to dependent claim 4, and Cadel, which is applied to dependent claims 4 and 16, were not relied upon for teachings which could overcome the deficiencies in the examiner's arguments regarding the evidence relied upon by appellants, we also conclude that the rejections of claims 4 and 16 as stated and argued by the examiner are not well founded.

We remanded the application to the examiner (paper no. 28, mailed April 6, 2000) to 1) undertake a claim-by-claim analysis; 2) consider the scope of appellants' claims; 3) consider the "reach" of the *prima facie* case of obviousness, i.e., the extent to which some, but not all, of the claimed subject matter would have been *prima facie* obvious in view of the cited prior art; 4) consider the degree of predictability or unpredictability in the art; 5) consider the comparative data set forth in the Kanda Declaration and, taking into account those factors, address the question of whether the

evidence presented in the Kanda Declaration is commensurate in scope with each of appellants' claims.

The examiner has not followed any of the board's guidance. The examiner has not undertaken a claim-by-claim analysis but, rather, has merely pointed out (supplemental answer, page 2) that appellants state that the claims stand or fall together (brief, page 5). The record upon which this statement was based, however, did not include a claim-by-claim analysis by the examiner of whether the evidence relied upon by appellants is commensurate in scope with the claims. Thus, there was no argument by the examiner for appellants to challenge regarding whether the evidence is commensurate in scope with each claim.

The examiner has not addressed whether some, but not all, claims would have been *prima facie* obvious to one of ordinary skill in the art over the applied prior art, addressed the predictability or unpredictability of the art and, based upon this analysis, explained why the evidence relied upon by appellants is not commensurate in scope with each claim for which a *prima facie* case of obviousness has been established.

The examiner has merely argued that appellants should have provided more examples and that appellants have not provided evidence or reasoning which shows that one of ordinary skill in the art would have extrapolated the evidence to the full scope of the claims (supplemental answer, pages 5-6). Thus, we are not persuaded that the evidence relied upon by appellants is insufficient to overcome the *prima facie* case of obviousness. Accordingly, we reverse the rejections of claims 1-5 and 7-17.

*Rejection of claim 18*

Appellants' claim 18 is directed toward a water-in-oil emulsion which is prepared by a polymerization process wherein the dissolved oxygen concentration of the emulsion before polymerization is about 100 ppb or less. As indicated above, the examiner's conclusion that it would have been obvious to one of ordinary skill in the art to use a dissolved oxygen concentration of about 100 ppb or less when making Fan's water-in-oil emulsion is not well founded. Also, the examiner has not explained why a water-in-oil emulsion made according to Fan's procedure wherein the dissolved oxygen concentration

Appeal No. 96-2323  
Application 08/116,555

before polymerization is greater than about 100 ppb would be the same or substantially the same as that claimed in appellants' claim 18. We therefore reverse the rejection of claim 18.

Appeal No. 96-2323  
Application 08/116,555

*DECISION*

The rejections under 35 U.S.C. § 103 of claims 1-3, 5, 7-15, 17 and 18 over Fan, claim 16 over Fan in view of 13

*Encyclopedia*

*of Polymer Science and Engineering*, and claims 4 and 16 over Fan in view of Cadell, are reversed.

*REVERSED*

SHERMAN D. WINTERS	)	
Administrative Patent Judge	)	
	)	
	)	
	)	BOARD OF PATENT
JOHN D. SMITH	)	
Administrative Patent Judge	)	APPEALS AND
	)	
	)	INTERFERENCES
	)	
TERRY J. OWENS	)	
Administrative Patent Judge	)	

Appeal No. 96-2323  
Application 08/116,555

Sughrue, Mion, Zinn, Macpeak & Seas  
2100 Pennsylvania Avenue, N.W.  
Washington, DC 20037-3202

TJO:caw